TO: **Andrew Christensen, Chair, Space Science Advisory Committee**

FROM: **Jonathan I. Lunine, Chair, Solar System Exploration Subcommittee**

SUBJECT: **Solar System Exploration Subcommittee Meeting**

The Solar System Exploration Subcommittee (SSES) of the Space Science Advisory Committee (SScAC) met July 26-27, 2004 in San Diego. The purpose of this memorandum is to summarize the findings of that meeting and ask SScAC to consider them and transmit its recommendations to Mr. Orlando Figueroa, Director of the Solar System Exploration.

Mars

Topic: Subsequent to the SSES February meeting the Mars Exploration Rover Opportunity found additional compelling evidence, along multiple lines, for the past presence of standing liquid water in the Meridiani Planum Region of Mars. This water was pervasive over an area that includes all of the rover traverse to date. The discovery is of historic importance. Circumstantial evidence for water exists in rocks at the Spirit site. Both rovers have traversed several times their designed distances and continue to function, in particular through the onset of southern hemisphere winter. Because of these finds, the Mars Exploration Program is now moving on "Pathway 1: Search for Evidence of Past Life" sequence of Mars Exploration.

Issue: It is now necessary to examine the integration of the mission augmentation from the President's Moon-Mars Initiative into the plan; for example, whether two Scouts and an additional lander in support of future human exploration of Mars should be fielded in 2011.

Recommendation: SSES will examine the 2009-2020 sequence in light of the President's initiative and the MER discoveries this fall, and present its findings to SScAC at the latter's fall meeting.

JIMO

Topic: JIMO funding phasing and technology development are such as to permit a launch around 2015, with an arrival at Europa in 2022 or 2023.

Issue: This arrival date pushes JIMO beyond the decadal survey horizon and introduces a potentially unprecedented hiatus in outer solar system missions. The mission is a top priority of the recent decadal survey for solar system exploration..

Recommendation: Space Science must give high priority to completing and launching JIMO under Project Prometheus, lest outer solar system exploration beyond Cassini and New Horizons effectively cease.

Discovery

Topic: With Messenger finally launched on its long voyage to Mercury, and Genesis and Stardust having completed their sample collection mission phases, SSES commends the SSED Director for his strong efforts in putting the Discovery program back on track.

Issues: (1) Kepler development is now running into problems and the confirmation review is coming up. (2) The new Discovery program office is being moved to Marshall Space Flight Center(because of external complaints about conflict of interest) and planetary expertise is lacking at Marshall. In its previous letter SSES commended the SSED Director for establishing an office at JPL.

Solution: For the good of the program, the SSES continues to support a strong policy of nonconfirmation and cancellation for missions that cannot maintain their proposed cost and schedule. SSES also will request a briefing from the Discovery Program Office at Marshall regarding their organizational and staffing plans.

New Horizons

Topic: The New Horizons (NH) mission will provide the first exploration of the outermost bodies of the solar system, particularly their volatile and organic components, and will address two of the four central themes highlighted in the 2003 Solar System Exploration Decadal Survey.

Issue: NH launch opportunity in 2006 is greatly threatened by the indefinite stand down of all activities at LANL, where RTG fuel packaging is ongoing, and by the launch vehicle certification schedule. The science hit accompanying a 2007 fallback launch is considerable – loss of a Jupiter flyby and the delay by several years of the Pluto-Charon and KBO flybys.

Solution: NASA should continue in its path to try to launch New Horizons as soon as is practical. This crisis in bringing the mission to launch readiness illustrates the need to find alternate sources for nuclear fuel packaging and other critical path items for outer solar system missions.

DSN

Topic: SSES is impressed with NASA's identification and pursuit of new technologies for increasing the data volume return, data rate, and robustness of the DSN. If the plans were implemented, data return from deep space missions could be enhanced by as much as three orders of magnitude thereby enabling more comprehensive coverage and detailed study in planetary exploration without requiring more costly communications systems on spacecraft.

Issue: Exploration goals require increased data return from future planetary missions. Furthermore, the current system is 40 years old and is a single-point failure for deep space command/control and data return.

Recommendation: SSES urges NASA to implement the system upgrades and new technology communications systems on an aggressive schedule that will minimize the chance of DSN saturation or potential catastrophic failure.

Planetary data system

Topic: SSES reviewed the status of the Planetary Data System to examine whether progress had been made on its previous recommendations. Indeed, PDS is addressing many of the committee's concerns, including the issue of peer review of data. SSES notes that PDS is a unique resource to the planetary community, and accomplishes planetary data archiving in a way that is suitable and appropriate.

Issue:. The strategy for achieving the necessary level of peer review of PDS data remains unclear. A cataloging system for samples will not be implemented for *Genesis* at the time of its return to Earth this year. Merging of former NASA science codes raises the possibility of "one size fits all" for science archival data systems.

Recommendations: The SSES will continue to monitor PDS progress. PDS should proceed assertively with its plans for implementation of *Stardust* sample cataloguing, which is more crucial for that particular mission. PDS should remain a separate data system and not be merged with other data systems within Space Science.

SECAS—SSES

Topic: There is a long history of space physics investigations and scientific accomplishments on planetary missions, illustrating the large overlap between the science communities represented by SSES and SECAS. At the San Diego meeting joint talks were held between SSES and SECAS to discuss areas of mutual interest and concern.

Issue: Some members of the two communities are concerned that insufficient opportunities for flight collaboration are available between space physics and solar system exploration.

Recommendation It was agreed that both groups should continue to encourage cooperation among scientists in the two areas and should be represented in each others' Roadmap committees in appropriate areas.

Sounding rockets (recommendation joint with SECAS)

Topic: The planetary science community has benefited from the sounding rocket program principally in that the program provides unique opportunities for graduate

students to acquire flight experience while developing new observational capabilities. Several planetary PI's have had their roots in the sounding rocket program.

Issue: The projected sounding rocket program budget through FY09 requires a major scaling back of the program. The Sounding Rocket Program Office (SRPO) has submitted a proposal for this reduction, which does not meet the needs of the Sun-Earth Connection.

Recommendation: The planetary program is not a major user of the present sounding rocket program, but does benefit significantly from students trained in association with the program. The SSES supports the proposed plan to conduct a zero-based review of the program as a means of identifying the critical needs and seeing that they can be adequately supported. The SSES hopes that this review will help continue the opportunity for developing new flight investigation scientists, even as it fulfills critical needs in SEC science.

Finally, SSES wishes to thank Orlando Figueroa for his service as both Mars Exploration and Solar System Exploration Director, and commends him for his numerous accomplishments during this time. We will miss him and look forward to his tenure as a Deputy Associate Administrator in the Office of Space Science.

Sincerely

Jonathan I. Lunine, Chair